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10/809,421	03/26/2004	Jin Ki Kim	PAT 980-2	7842
26123	7590	01/09/2009	EXAMINER	
BORDEN LADNER GERVAIS LLP			HUR, JUNG H	
Anne Kinsman			ART UNIT	PAPER NUMBER
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NOTIFICATION DATE	DELIVERY MODE			
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/809,421	KIM, JIN KI	
	Examiner	Art Unit	
	J. H. Hur	2824	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 23 October 2008.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 29-32,38 and 48-55 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 29-32,38 and 48-55 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 26 March 2004 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 23 October 2008 has been entered.

Amendment

2. Acknowledgment is made of applicant's Amendment, filed 23 October 2008. The changes and remarks disclosed therein have been considered.

Claims 34 and 56-59 have been cancelled by Amendment. Therefore, claims 29-32, 38 and 48-55 remain pending in the application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 29-32, 38 and 48-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. Appl. Pub. No. 2003/0123269 (“GILLINGHAM”) in view of U.S. Pat. No. 6,697,276 (“PEREIRA”) and Applicant’s Admitted Prior Art (“AAPA”).**

Regarding claim 29, GILLINGHAM discloses a content addressable memory (CAM) device comprising: rows of matchlines (within 102 in Fig. 1(a)) precharged to a voltage level corresponding to a miss condition (see for example Figs. 2(a) and 2(b) and paragraph [0039]), each of the rows of matchlines including a first matchline segment (one MLS in Figs. 2(a) and 2(b)) and a second matchline segment (another MLS in Figs. 2(a) and 2(b)); a first number of ternary cells connected in parallel to each of the first matchline segments, where only the ternary cells are connected to each of the first matchline segments (104 connected to said one MLS in Figs. 2(a) and 2(b); see also Fig. 1(c) and paragraphs [0025] and [0038]); a second number of cells connected in parallel to each of the second matchline segments (104 connected to said another MLS in Figs. 2(a) and 2(b)), operable simultaneously with the ternary cells (since both are in the same search row in Figs. 2(a) and 2(b)); and, matchline sense amplifiers (including 210 in Figs. 2(a) and 2(b)) connected to the first matchline segments and the second matchline segments for detecting one of the miss condition and a match condition of the first matchline segments and the second matchline segments in response to search data (see Figs. 2(a) and 2(b)).

GILLINGHAM does not disclose that the second number of cells is binary cells smaller in size than the ternary cells, and that only the binary cells are connected to each of the second matchline segments.

However, GILLINGHAM discloses that the second number of cells is also ternary cells (i.e., all the cells in a search row are ternary cells; see for example paragraphs [0038] and [0025]). GILLINGHAM also discloses that each of the segments can have an equal number of cells (see for example paragraph [0038]).

PEREIRA discloses each row in a CAM device including a number of binary cells and a number of ternary cells according to application needs, as an obvious variation/alternative to all cells in each row being ternary cells (see for example column 34, lines 16-23).

AAPA discloses well known ternary cells (Figs. 3 and 4) and binary cells (Fig. 5) which are smaller in size than the ternary cells (compare Fig. 5 with Figs. 3 and 4).

Therefore, in view of PEREIRA, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to include a number of binary cells and a number of ternary cells in each row of GILLINGHAM's CAM device (as suggested in PEREIRA; for example, in the search row of Figs. 2(a) and 2(b) of GILLINGHAM), such that, as an optimum arrangement according an application need, the first number of ternary cells and only ternary cells would be connected in parallel to the first matchline segment, and a second number of binary cells and only the binary cells would be connected in parallel to the second matchline segment (for example, a matchline with 64 bit cells is divided into 4 segments of 16 bit cells each, while the first 24 bit cells of the matchline are provided with ternary cells and the last 40 bit cells with binary cells, in order to provide a search index with an adjustable width ranging from a minimum of 40 bits to a maximum of 64 bits according to an application need). Such arrangement would be an obvious variation/alternative to the arrangement of GILLINGHAM (in which all cells in each search row are ternary cells in Figs. 2(a) and 2(b)), since PEREIRA indicates a desirability of such arrangement according to application needs, recognized by a person of ordinary skill in the art (implied in PEREIRA column 34, lines 16-23).

Further, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use the ternary and binary cell configurations of AAPA in

GILLINGHAM's CAM device as modified above, such that the binary cells would be smaller in size than the ternary cells, since such ternary and binary cell configurations, in which binary cells are smaller in size than ternary cells, were common and well known in the art (as exemplified in AAPA; see Figs. 3-5).

Regarding claim 30, the above combination discloses the content addressable memory device of claim 29, wherein the ternary cells include SRAM based ternary content addressable memory cells (see Figs. 3 and 4 of AAPA, as applied to the above combination; see also paragraph [0038] of GILLINGHAM, as applied to the above combination).

Regarding claim 31, the above combination discloses the content addressable memory device of claim 30, wherein the binary cells include SRAM based binary content addressable memory cells (see Fig. 5 of AAPA, as applied to the above combination).

Regarding claim 32, the above combination discloses the content addressable memory device of claim 29, wherein the ternary cells include DRAM based ternary content addressable memory cells (see for example the second half of paragraph [0035] of GILLINGHAM, as applied to the above combination).

Regarding claim 38, the above combination discloses the content addressable memory device of claim 29, but does not disclose that the first number is selected to store at least a corresponding number of header bits.

However, AAPA further discloses use of ternary cells for header bits (see for example AAPA paragraph [0013]).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the first number to store at least a corresponding number of header bits in the above combination, for the purpose of effectively and efficiently accommodating variable bit length headers (see for example AAPA, near the end of paragraph [0012] and paragraph [0013]).

Regarding claims 48 and 52, the above combination discloses the content addressable memory device of claim 29, wherein one matchline sense amplifier connected to the first matchline segment is configured to disable one matchline sense amplifier connected to the second matchline segment in response to the miss condition of the first matchline segment (since, in the above combination, if a sense amplifier of a segment indicates a miss condition, the sense amplifiers in the subsequent segments indicate a miss condition regardless of miss/match conditions of the subsequent segments; see for example paragraphs [0041] and [0043], of GILLINGHAM, as applied to the above combination; note that, for claim 52, the first and second matchline segment designations are reversed).

Regarding claims 49 and 53, the above combination discloses the content addressable memory device of claims 48 and 52, wherein the one matchline sense amplifier connected to the second matchline segment is configured to provide a match output if the first matchline segment and the second matchline segment have the match condition (see for example paragraphs [0042] and [0043] of GILLINGHAM, as applied to the above combination; note that, for claim 53, the first and second matchline segment designations are reversed).

Regarding claims 50 and 54, the above combination discloses the content addressable memory device of claim 29, wherein the second matchline segment is at the voltage level corresponding to the miss condition when the first matchline segment is at the voltage level corresponding to the miss condition (see for example Figs. 2(a) and 2(b) and paragraphs [0039], [0041] and [0043] of GILLINGHAM, as applied to the above combination; note that, for claim 54, the first and second matchline segment designations are reversed).

Regarding claims 51 and 55, the above combination discloses the content addressable memory device of claim 29, wherein the ternary cells connected to the first matchline segments are searched in a first search and compare cycle, and the binary cells connected to the second matchline segments are searched in a second search and compare cycle after the first search and compare cycle (i.e., sequentially; see for example paragraph [0044] of GILLINGHAM, as applied to the above combination; note that, for claim 55, the first and second matchline segment designations are reversed).

Regarding claim 56, the above combination discloses the content addressable memory device of claim 29, wherein the first matchline segment includes a third number of binary cells (as one of the optimum arrangements in the above combination for claim 29, based on application needs, in which at least two segments include both ternary and binary cells).

Regarding claim 58, the above combination discloses the content addressable memory device of claim 29, wherein the second matchline segment includes a third number of ternary cells (as one of the optimum arrangement in the above combination for claim 29, based on application needs, in which at least two segments include both ternary and binary cells).

Response to Arguments

5. Applicant's arguments filed 23 October 2008 have been fully considered but they are not persuasive.

In response to the argument, in the bottom half of page 7, that “[b]ased on the teachings of Pereira et al. and Gillingham, a person skilled in the art would only be led to a segmented matchline scheme where each of the matchline segments have a mix of binary and ternary CAM cells” (emphasis added), Examiner notes that such segmented matchline scheme would not be the only one. In fact, based on the teachings of Pereira and Gillingham, it would be reasonable for one of ordinary skill in the art to consider a segmented matchline scheme in which one matchline segment would have only ternary cells while another matchline segment would have only binary cells. For example, a matchline with 64 bit cells is divided into 4 segments of 16 bit cells each (based on, for example, Gillingham paragraph [0038]), while, in order to provide a search index with an adjustable width ranging from a minimum of 40 bits to a maximum of 64 bits according to an application need, the first 24 bit cells of the matchline are provided with ternary cells and the last 40 bit cells with binary cells (based on, for example, Pereira column 34, lines 6-23), such that at least one matchline segment would have only ternary cells while another matchline segment would have only binary cells.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. H. Hur whose telephone number is (571) 272-1870. The examiner can normally be reached on M-F 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jhh

/J. H. Hur/
Primary Patent Examiner, Art Unit 2824
24 December 2008